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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOICHI SANO

Appeal 2008-0747
Application 10/629,165
Technology Center 1700

Decided: February 14, 2008

Before CHARLES F. WARREN, CATHERINE Q. TIMM, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

I Appellant appeals under 35 U.S.C. § 134 the final rejection of claims 3-15. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).
We AFFIRM.

INTRODUCTION

Appellant claims a method of producing electrolyzed water comprising, in relevant part, feeding softened water to a cathode chamber and unsoftened water to the anode chamber, and controlling the flow rate of

the softened water to the cathode chamber such that it is no greater than 40 mL/min. per ampere of loading current. Appellant discloses that by controlling the flow rate to be no greater than 40 mL/min. per ampere and using softened water in the cathode chamber, scale formation on the cathode plate can be effectively avoided (Spec. 2).

Claim 12 is illustrative:

12. A method of producing acidic and alkaline electrolyzed water, comprising the steps of:

providing an electrolyzer having an anode chamber containing an anode and a cathode chamber containing a cathode separated by a diaphragm;

feeding softened water to the cathode chamber and unsoftened water containing an electrolyte to the anode chamber; and

performing electrolysis in the electrolyzer to produce acidic and alkaline electrolyzed water, wherein the flow rate of the softened water to the cathode chamber is no greater than 40 mL/min. per ampere of loading current.

The Examiner relies on the following prior art references as evidence of unpatentability:

Yamaguti	5,445,722	Aug. 29, 1995
Su	5,837,124	Nov. 17, 1998
Sawamoto	6,143,163	Nov. 7, 2000
Shirota	6,464,845 B2	Oct. 15, 2002

The rejections as presented by the Examiner are as follows:

1. Claims 3, 4, 6-8, and 12-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shirota in view of Yamaguti.

2. Claims 5, and 9-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiota in view of Yamaguti and Su.
3. Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiota in view of Yamaguti and Sawamoto.

Appellant separately argues claims 12 and 13 with regard to whether the Examiner established a prima facie case (Br. 5-8, 10). With regard to claim 13, Appellant further argues that evidence provided in the Specification establishes criticality of the combination of softened water and the claimed flow rate (i.e., unexpected results) so as to rebut any prima facie case (Br. 8-10).

OPINION

35 U.S.C. § 103 REJECTION OVER SHIROTA IN VIEW OF YAMAGUTI

The Examiner finds that Shiota discloses all the features of claims 12 and 13, except for the claimed flow rate of the softened water (Ans. 3-4). With regard to the softened water claim feature, the Examiner finds that Shiota uses “pure water” (i.e., water with anions and cations removed) as make-up water in a container bath 4, which holds the recirculating alkaline water (Ans. 8). The Examiner further finds that the alkaline water contains sodium ions from the electrolysis process such that the combination of the “pure water” with the alkaline water would constitute “softened water” (Ans. 8).

With regard to the claimed flow rate, the Examiner finds that Yamaguti discloses that the ratio of the flow rate through the electrolytic cell

to the applied current in the cell is a result-effective variable such that it would have been obvious to modify Shirota by optimizing the ratio of the flow rate in the cathode chamber to the applied current (Ans. 4).

Appellant argues that “softened water” is water in which calcium, magnesium and other divalent and higher cations found in ordinary water are exchanged for sodium ions, using a cation exchange resin (Br. 6). Appellant contends that Shirota’s alkaline water is not “softened water” because magnesium and calcium cations contained within the tap water used on the anode side of the electrolyzer would transfer over to the cathode compartment during the electrolysis process and, thus, be contained in the alkaline water (Reply Br. 3). Appellant further argues that Yamaguti does not disclose anything advantageous would be obtained by feeding softened water into a cathode chamber at the claimed flow rate (Br. 8).

Appellant further argues that even if it is determined that Shirota in view of Yamaguti establish a prima facie case of obviousness, there is sufficient objective evidence (i.e., unexpected results) to rebut the prima facie case of obviousness (Br. 8).

We have considered all of Appellant’s arguments and evidence, and are unpersuaded for the reasons below.

We begin by construing claims 12 and 13, specifically the claim phrase “softened water.” During examination claim terms are given their broadest reasonable interpretation consistent with the Specification. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

“Softened water” is not defined in Appellant’s Specification. Rather, Appellant only discloses that cationic exchange resin may be used to make the “softened water” (Spec. 3, 7). Accordingly, we seek guidance from

additional sources to determine the proper construction for the claim phrase “softened water.”

Hawley’s Condensed Chemical Dictionary defines “softener” as a substance that reduces the hardness of water by removing or sequestering calcium and magnesium ions and directs one to see the definition of “hard water”.¹ Appellant’s argument that “softened water” is water in which the calcium, magnesium and other divalent and higher cations found in ordinary water are exchanged for sodium ions agrees with this definition (Br. 6).

Hawley’s definition of “hard water” further explains that the degree of hardness of water is measured in grains per gallon of calcium carbonate and that water measuring 5 grains is considered soft and over 30 grains is considered very hard.² The *McGraw-Hill Encyclopedia of Science & Technology* also explains that water that contains more than 120 mg of divalent cations (usually magnesium and calcium) expressed in terms of calcium carbonate is generally classified as hard water.³ In other words, there are varying degrees of “softened water” such that the claim phrase includes a certain amount of divalent cations expressed in terms of calcium carbonate.

Based on these definitions, we construe “softened water” as water that contains sodium ions and up to 120 mg of divalent cations measured in terms of calcium carbonate.

¹ *Hawley’s Condensed Chemical Dictionary*, 1073 (12th Ed. Richard J. Lewis, Sr. ed. 1993).

² *Hawley’s Condensed Chemical Dictionary*, 1224 (12th Ed. Richard J. Lewis, Sr. ed. 1993).

³ *McGraw-Hill Encyclopedia of Science & Technology*, 337-38 (Vol. 19, 1992).

Shirota discloses that pure water is supplied to a container bath 4 via raw water supply 7a', which is then circulated through the cathode chamber during the electrolysis so as to form alkaline water (Shirota, col. 7, ll. 42-51, 62-67, col. 8, l. 1). Shirota discloses that "pure water" is relatively costly water, from which anions and cations have been removed (Shirota, col. 2, ll. 31-32). Shirota discloses that container bath 4 receives alkaline water from the cathode chamber 2c for either recirculation of the alkaline water into the cathode chamber or removal of the alkaline water for use in another application (Shirota, col. 7, ll. 28-41). Shirota discloses that during the electrolysis process the recirculated water is converted into alkaline water and is made more alkaline by receiving sodium ions that transfer from the electrolyte into the cathode chamber during the electrolysis (Shirota, col. 7, ll. 62-67, col. 8, l. 1-17).

From these disclosures, we agree with the Examiner (Ans. 8) that Shirota's alkaline water constitutes "softened water." Specifically, the pure water has anions and cations removed such that there would be no magnesium or calcium ions present in the pure water. Moreover, the alkaline water, formed from the pure water, has sodium ions added to it during the electrolysis process, as softened water does during the water softening process.

Appellant's argument that the alkaline water is hard water because it contains magnesium and calcium ions which transfer across the diaphragm during the electrolysis process (Reply Br. 3) is unpersuasive for two reasons. First, it is unclear from Shirota's disclosure if the alkaline water contains magnesium and calcium ions as argued by Appellant.

Second, the Examiner has established that Shiota's alkaline water is made from pure water (i.e., anions and cations removed) and contains sodium ions (Ans. 8) such that it is substantially identical to Appellant's softened water. Therefore, even if Shiota's alkaline water does contain magnesium and calcium ions as argued, Appellant's burden of showing that the concentration of the magnesium and calcium cations is high enough to constitute "hard" water (i.e., greater than 120 mg measured in term of calcium carbonate, the general threshold for "hard" water) has not been satisfied. *In re Best*, 562 F.2d 152, 1254-55 (CCPA 1977) ("Where, as here, the claimed and prior art products are identical or substantially identical, . . . the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of the claimed product.") Appellant has not proffered any evidence that the magnesium and calcium cation concentration of Shiota's alkaline water would be great enough to constitute "hard" water.

Regarding the argued flow rate claim feature, Appellant does not dispute the Examiner's determination that the ratio of the flow rate in the electrolytic cell to the applied current is a result-effective variable such that it would have been obvious for one of ordinary skill in the art to determine an optimum value for the ratio of the flow rate to the applied current. *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977). Rather, Appellant argues that Yamaguti does not indicate that there is any advantage in using a flow rate of no greater than 40mL/min. per ampere (Br. 8).

However, as indicated by Appellant (Br. 8), Yamaguti discloses what would have been obvious to one of ordinary skill in the art: as the flow rate through the electrolytic chambers decreases, the electrolytic degree (i.e., the

basic or acidic pH) of the water increases (Yamaguti, col. 12, ll. 25-29). In other words, Yamaguti clearly indicates to decrease the flow rate when an increase in the electrolytic degree of the water is desired. Accordingly, in view of the Examiner's uncontested determination that Yamaguti discloses that the ratio of flow rate to applied current is a result-effective variable, it would have been obvious to optimize the ratio such that the flow rate is no greater than 40mL/min. per ampere of applied current because Yamaguti discloses an advantage in decreasing the flow rate to a lower value (e.g., no greater than 40 mL/min. per ampere) in order to increase the electrolytic degree of the water. Accordingly, Appellant's argument is unpersuasive.

For the above reasons, we determine that the Examiner has established a prima facie case of obviousness. Accordingly, the burden shifted to Appellant to provide evidence or arguments to rebut the Examiner's prima facie case. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

With regard to the rejection of claim 13, Appellant attempts to rebut the prima facie case of obviousness by showing the criticality of combining the claimed flow rate and the use of softened water in the cathode chamber (i.e., unexpected results) (Br. 8-10).

Where the difference between the claimed invention and the prior art involves a range, applicant must show that the particular range is critical, generally, by showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990).

Appellant's evidence compares Specification Example 1 that uses a flow rate of 15.4 mL/min per ampere and softened water in the cathode

chamber, with Comparative Example 1 that uses a flow rate of 154 mL/min per ampere and softened water and Comparative Example 2 that uses a flow rate of 15.4 mL/min per ampere and unsoftened water in the cathode chamber (Br. 8-9).⁴

However, Appellant's evidence does not provide a meaningful comparison to establish criticality of the combination of the claimed range "no greater than 40 mL/min per ampere" with softened water. Specifically, Appellant's comparative example (i.e., 154 mL/min. per ampere) is so much greater (i.e., 10 times greater) than the 15.4 mL/min. per ampere flow rate example that falls within the claimed range, that it defies any meaningful comparison in the absence of an explanation and/or evidence of the practical significance of the comparison vis-à-vis the claimed range and its criticality in view of the teachings of the prior art.

Having given due consideration to Appellant's evidence of nonobviousness, we determine from the totality of the record that Appellant's evidence is insufficient to overcome the Examiner's prima facie case of obviousness. For the reasons above, we sustain the Examiner's § 103(a) rejection of claims 3, 4, 6-8, and 12-14 over Shirota in view of Yamaguti.

⁴ The Examiner on page 9 of the Answer calculates the flow rate of the examples provided by Appellant in the Specification (i.e., Example 1, and Comparative Examples 1 and 2) and used as evidence of unexpected results. Appellant has not contested the Examiner's calculated flow rates. In fact, Appellant's calculation of the flow rate in Example 1 on page 8 of the Brief agrees with the Examiner's calculation.

REMAINING § 103 REJECTIONS

With regard to the § 103 rejection over Shirota in view Yamaguti and Su and the § 103 rejection over Shirota in view of Yamaguti and Sawamoto, Appellant argues the same claim features and provides the same evidence of unexpected results previously argued and provided with regard to the § 103 rejection over Shirota in view of Yamaguti. As noted above, we are unpersuaded by Appellant's arguments and determine that Appellant's evidence is insufficient to rebut the Examiner's prima facie case of obviousness. Accordingly, the Examiner's § 103 rejections over Shirota in view Yamaguti and Su, and Shirota in view of Yamaguti and Sawamoto receive the same disposition as the § 103 rejection over Shirota in view of Yamaguti.

Accordingly, we sustain the following rejections: (1) the § 103 rejection of claims 5 and 9-11 over Shirota in view of Yamaguti and Su, and (2) the § 103 rejection of claim 15 over Shirota in view of Yamaguti and Sawamoto.

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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Application 10/629,165

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